

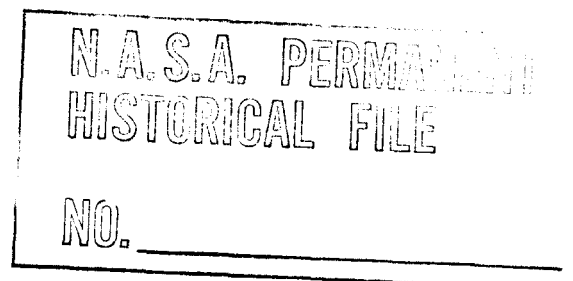
Statement of James E. Webb, Administrator,
National Aeronautics and Space Administration
before the
Senate Committee on Aeronautical and Space Sciences

September 1, 1961

Mr. Chairman and Members of the Committee:

In order to accomplish the missions of the expanded national space program, it will be necessary that we employ launch vehicles much larger than those currently in use or under development. The technical specifications for these vehicles are now under intensive study, but it is already obvious that we will have to use boosters having as much as 12 to 20 million pounds of thrust, or more than eight to thirteen times as large as the Saturn C-1.

One of the most serious problems that confronts us in the utilization of these very large boosters is the selection of an adequate launching site. In addition to considering the hazards that would accompany explosions of the vehicles on or near the launch pads, we must consider the hazards from the tremendous noises that will be generated in the early stages of flight. These considerations have led to a determination that exclusion zones of 7 to 10 miles will be necessary in the vicinity of the launch pads -- zones which must be under strict control and in which the general public cannot be present. The existing launching areas at Cape Canaveral cannot accommodate the necessary exclusion zones.



A survey team was established early this summer under the joint direction of NASA and the Department of Defense to analyze these and other launch requirements for the manned lunar landing program, to establish criteria for the selection of an adequate launch site, and to evaluate potential launching sites. This team established general criteria for guidance of their study activities. These criteria included the requirements

- (a) that it be possible to launch in an easterly direction in order to make maximum utilization of the earth's rotation;
- (b) that the impact areas for the first and second stage boosters be uninhabited;
- (c) that the initial flight path not be over areas that could suffer severe life and property damage in the event of vehicle malfunction during the boost phase of flight;
- (d) that the launch site be accessible to water transport of the very large booster components that are to be fabricated and static-tested elsewhere; and
- (e) that the launching sites make maximum utilization of existing NASA and DOD resources.

The survey team initially considered a great many sites. Through application of the above criteria, it was possible to narrow these down to seven sites that received intensive analysis. From this analysis,

and considering the costs required to bring the launch site to a full operational capability, it was concluded that the most advantageous location would be immediately adjacent to the existing Cape Canaveral Missile Test Area.

The Bill before you is a request for authorization for appropriations of \$60 million to acquire the approximately 80,000 acres determined to be necessary for the expanded launching area.

The 1962 authorization act enacted by the Congress earlier this year provided initial authorizations for the launch site. There was no request at that time for funds to acquire the launch site because, in the absence of definitive criteria and site evaluations, it was thought that the Department of Defense might be able to furnish the required area as part of their national missile range facilities. This was not possible and it was, therefore, decided that NASA should acquire and develop the necessary area.

The acquisition of the proposed launching site adjacent to Cape Canaveral is an urgent requirement for the timely conduct of the expanded space program. It is estimated that construction of the launch facilities for the very large launch vehicles will require as much as four years or more. This construction must proceed in the very near future if we are to be ready to flight test the new vehicles at the earliest possible time. Passage of the bill before you will allow NASA

to proceed at once with the acquisition of land for the launching area so that the facility construction can be initiated in the near future. We can temporarily finance the early land acquisition costs within our present appropriation. I indicated, however, in my letter to the Congress that NASA will seek a supplemental appropriation for the land acquisition in January.

With the Chairman's permission, I would like to ask Dr. Hugh Dryden to discuss the evaluation of several potential launch sites which led to the selection of the proposed site.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Selection of Launch Site for Manned Lunar Landing Program

A survey team jointly headed by the Director, Launch Operations Directorate (National Aeronautics and Space Administration), and the Commander, Air Force Missile Test Center (Department of Defense), was directed to analyze launch requirements to implement a manned lunar landing program and to establish a basis for the selection of a launching site for the new very large launch vehicles required in the execution of the program.

In the conduct of their study, the team established the technical criteria required of a launching site and, after an initial survey, made an extensive evaluation of seven potential launching areas. In alphabetical order these were (1) a site on the mainland of the Gulf Coast near Brownsville, Texas; (2) an area adjacent to the existing launch site at Cape Canaveral, Florida; (3) Christmas Island in the mid-Pacific south of Hawaii; (4) Cumberland Island, Georgia; (5) a site at South Point, Island of Hawaii; (6) Mayaguana Island in the Bahamas group; and (7) the White Sands Missile Range, New Mexico. The principal factors evaluated in the site comparison are indicated on the attached chart and the conclusions for each site are discussed below.

National Ownership

The question of national ownership was considered in terms of the speed with which necessary land acquisition for site development could be consummated. The only potential problem areas exist at Christmas Island, which is under United Nations trusteeship, and at Mayaguana Island, which is owned by Great Britain. In these two cases international agreements would have to be achieved before site development work could actually proceed.

Launch Vehicle Impact Hazard

The study considered the normal booster impact hazards associated with fall-out of first and second launch vehicle stages. It was considered that launch azimuths from 60 to 120 degrees would be desirable to accommodate various mission profiles and the booster impact zones were considered for this entire launch fan.

The impact hazard was not considered a serious problem for any of the sites except for

- (a) the Brownsville, Texas, site where the launch azimuth would have to be limited to between approximately 80 and 90 degrees in order to minimize land impact of the first and second stages and
- (b) the White Sands Missile Range where it was determined that the first stage for both the Saturn C-3 and the Nova vehicles would impact on land regardless of the launch azimuth within the fan desired. Several cities such as Big Spring, Midland,

Fort Worth, Dallas, Austin, Galveston, and Houston, Texas, are within this fan. To minimize land impact hazards, it would be necessary to severely limit the launch azimuth in order to avoid highly populated areas. Although the second stage of the Nova vehicle would be expected to impact in the Atlantic Ocean, the Saturn C-3 second stage impact zone could include portions of the Eastern United States.

Overflight Hazard

In addition to considering the normal impact zones for the booster stages, it was necessary to consider possible impact areas resulting from launch vehicle malfunctions. It was determined that there was no serious overflight hazard for any of the launching sites except

(a) at Brownsville, Texas, where large portions of the United States, and in some cases Cuba, would be overflowed through second stage burnout. With the possibility of abort during first or second stage burning, especially during the early phases of the program, some sizeable population centers, such as Tampa, St. Petersburg, Palm Beach, and Miami, Florida, might be endangered;

(b) at the White Sands Missile Range, where each flight mission would have to be carefully reviewed on a case-by-case basis to minimize endangering population centers such as Memphis,

Tennessee; Birmingham, Alabama; Atlanta, Georgia;
New Orleans, Louisiana; Jacksonville, Florida; and
Dallas or Fort Worth, Texas, in the event of booster
malfunction.

Water Transport

The study considered as desirable the present concept for transporting large launch vehicles and spacecraft on a barge from the missile assembly plant to the launch area. This procedure is economical and allows flexibility of location of the fabrication and test sites relative to the launch site.

All of the sites considered would allow water access except the White Sands Missile Range. Use of the White Sands Missile Range would require some other method of vehicle transportation and, more importantly, would probably dictate that the launch vehicle assembly plant and static test stands be located near the launch site.

Interrupt Intracoastal Waterway

Three of the sites evaluated are contiguous to the Intracoastal Waterway. In these cases an evaluation was made to determine if the necessary blast damage and sound exclusion zones would intercept the waterway and thereby require closure of the waterway during launch operations. At Cape Canaveral, Florida, it was determined that such interruption would not be necessary. However, at Brownsville, Texas, and Cumberland Island, Georgia, it would be necessary to interrupt waterway access. In

the case of Cumberland Island there is a traffic rate through the waterway of about 16,000 vehicles annually, or approximately 50 per day on the average. Over twenty miles of the waterway would have to be closed for considerable periods of time at each launching operation.

Adjacent to Existing Capabilities

Launching operations are now conducted primarily at the three national missile ranges -- Atlantic Missile Range, Pacific Missile Range, and White Sands Missile Range. The study team considered that the most direct utilization of the manpower and physical resources now existing at these sites would be advantageous.

Of the sites evaluated, Cape Canaveral and the White Sands Missile Range would yield the greatest advantage in terms of utilizing or expanding existing physical plants and technical organizations. In particular, many missions within the overall manned lunar landing program will be conducted from Cape Canaveral using Atlas-Agena, Centaur, and Saturn C-1 launch vehicles. These missions will in many cases utilize the same contractors and supporting NASA personnel as the missions involving the Saturn C-3 and Nova launch vehicles. It was therefore concluded that important economy of resources could be achieved through a site near present Cape Canaveral.

Relative Facilities Cost

The survey team made detailed estimates of the total capital costs at each site, including land acquisition costs, for an operational

facility with three Saturn C-3 and three Nova launch complexes including launch pads, assembly and check-out facilities, and transport facilities; spacecraft assembly operations and support facilities; industrial support facilities; centralized communication facilities; and range support facilities. Of the sites considered, the White Sands Missile Range, an expansion of Cape Canaveral, the site at Brownsville, Texas, and the site at Cumberland Island, Georgia, were all at a comparable cost level for the total project. (The costs were within 7 percent of the lowest estimate for the White Sands Missile Range.) The sites at Hawaii, Mayaguana Island, and Christmas Island would all be considerably more expensive for final development.

From a consideration of the foregoing facts, it was concluded that the nation's interests would best be served by the selection of a launching site adjacent to the existing Cape Canaveral area. It presents no unsuitable features within the evaluation criteria, and the eventual site development costs, including land acquisition, are a minimum. These costs are estimated by principal category as follows:

Mission Facilities	\$700,000,000
Launch Support Facilities	125,000,000
Real Estate	<u>60,000,000</u>
Total	\$885,000,000

The mission facilities are the six launching complexes and required supporting facilities. The launch support facilities are the extensions to existing Atlantic Missile Range facilities required for the launch and tracking through injection of the spacecraft. Real estate cost is the estimated cost of acquiring approximately 80,000 acres necessary at this site.

EVALUATION OF LAUNCH SITES

	<u>National Ownership</u>	<u>Launch Vehicle Impact Hazard</u>	<u>Overflight Hazard</u>	<u>Water Transport</u>	<u>Interrupt Intracoastal Waterway</u>	<u>Adjacent to Existing Capabilities</u>	<u>Relative Facilities Cost</u>
<u>Brownsville, Texas</u>	U. S.	Yes	Yes	Yes	Yes	No	1.07
<u>Cape Canaveral, Florida</u>	U. S.	No	No	Yes	No	Yes	1.02
<u>Christmas Island</u>	U. N.	No	No	Yes	--	No	3.00
<u>Cumberland Is., Georgia</u>	U. S.	No	No	Yes	Yes	No	1.07
<u>Hawaii</u>	U. S.	No	No	Yes	--	No	1.87
<u>Mayaguana, Bahama Is.</u>	G. B.	No	No	Yes	--	No	2.41
<u>White Sands Missile Range</u>	U. S.	Yes	Yes	No	--	Yes	1.00